Notice of Allowability	**Application No.** 10/053,679	**Applicant(s)** SMITH, ROBERT J.	
	Examiner Agustin Bello	**Art Unit** 2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the interviews held 9/11/06 and 9/15/06, and the proposed amendment submitted by applicant*.

2. ☒ The allowed claim(s) is/are *1-24,26-58,60-74 and 76*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
   1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

A. Bello
Agustin Bello
Primary Examiner
Art Unit: 2613

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Bradely M. Knepper on 9/11/06 and 9/15/06.

The application has been amended as follows:

Claim 61 has been amended to depend from claim 58.

Claim 62 has been amended to depend from claim 58.

Claim 63 has been amended to depend from claim 58.

Claim 64 has been amended to depend from claim 58.

Claim 65 has been amended to depend from claim 58.

Claim 66 has been amended to depend from claim 58.

The remainder of the claims have been amended according to the proposed amendments discussed, approved, and noted below by the examiner.

1. (Currently Amended) A method for receiving high frequency signals transmitted through free space, comprising:

passing one or more optical signals, the one or more optical signals containing data and being composed of radiation of a plurality of differing wavelengths, through a diffractive optical element to form a plurality of signal segments, each signal segment having a different mean wavelength;

passing a portion of a beam comprising each of said one or more optical signals through a phase retarder that is provided separately from said diffractive optical element, wherein said portion of said beam passed through the phase retarder comprises an area of the beam that is less than a total area of the beam in cross-section, wherein said phase retarder has an area that is less than an area of said diffractive optical element, wherein a first portion of the optical signal is passed through said phase retarder, ~~and~~ wherein the first portion of the optical signal has a different phase than a second portion of the optical signal that is not passed through the phase retarder, and

detecting data in each of said plurality of signal segments at or near a different spatial focal point, wherein a portion of said plurality of said detected signal segments has passed through said phase retarder.

2. (Original) A method, as claimed in Claim 1, further comprising, before the passing step:

transmitting each of said optical signals through atmospheric distortion at a data rate that is greater than one gigabit/second for each wavelength.

3. (Original) A method, as claimed in Claim 1, wherein the diffractive optical element is a hologram, a zone plate, or combination thereof.

4. (Currently Amended) A method, as claimed in Claim 3, ~~wherein said phase retarder has an area that is less than an area of said diffractive optical element, wherein a first portion of the optical signal is passed through said phase retarder~~, wherein said phase retarder defines a disc shaped area that is located [[in]] adjacent a central portion of the diffractive optical element, ~~and wherein the first portion of the optical signal has a different phase than a second portion of the optical signal that is not passed through the phase retarder~~ and wherein said first portion is the radiation in the optical signal that contacts the diffractive optical element within a first radial distance of a center of the diffractive optical element while said second portion is the radiation that contacts the diffractive optical element outside the radial distance.

5. (Original) A method, as claimed in Claim 1, wherein:

in the detecting step, each of the plurality of signal segments is detected by a

different detector.

6. (Original) A method, as claimed in Claim 1, wherein:
in the detecting step, the mean wavelength of at least one of the signal segments is reduced before the at least one of the signal segments contacts a detector.

7. (Original) A method, as claimed in Claim 6, wherein at least one of the following conditions is true before a signal segment contacts a detector:
the spot size of the signal segment is reduced by a lens;
the mean wavelength of the signal segment is reduced by a lens; and
the intensity of a signal segment is increased by a lens.

8. (Original) A method, as claimed in Claim 1, wherein:
after the passing step and before the detecting step, the plurality of signal segments are reflected by a reflective surface.

9. (Original) A method, as claimed in Claim 1, wherein:
the optical signal has a beam size at an aperture of a source transmitter associated with the optical signal that is less than an atmospheric inner scale.

10. (Original) A method, as claimed in Claim 9, wherein the beam size at the transmitter is no more than about 10 mm.

11. (Currently Amended) A method for receiving high frequency signals transmitted through free space, comprising:
dividing an optical signal, the optical signal containing data and being composed of radiation of a plurality of differing wavelengths, into a plurality of signal segments, each signal segment having a different mean wavelength;
passing a portion of one of the divided optical signal and the optical signal through a phase retarder, wherein said portion is a partial cross section of the one of the divided optical signal and the optical signal;
reflecting said divided signals towards a plurality of spaced apart detectors;
reducing the spot size of the signal segments using an immersion lens that is integral to each of the plurality of detectors; and
detecting, with said plurality of spaced apart detectors data in each of said plurality of signal segments, wherein each of said spaced apart detectors is located substantially at a different focal point, the focal points being at different positions along a common optical axis, and wherein, and wherein each said focal points receives at least some of said portion of one of the divided optical signal and the optical signal passed through said phase retarder.

12. (Original) A method of Claim 11, wherein each of the detectors in located

in an end-to-end configuration relative to an adjacent detector.

13. (Original) The method of Claim 12, wherein the longitudinal axes of each of the detectors are at least substantially parallel to one another.

14. (Original) The method of Claim 13, wherein the longitudinal axes are at least substantially collinear.

15. (Original) The method of Claim 11, wherein in the dividing step the optical signal is passed through a diffractive optical element and a first portion of the optical signal is passed through one or more phase retarders.

16. (Original) A method, as claimed in Claim 15, wherein:
the first portion of the optical signal contacts a central portion of the diffractive optical element and wherein the first portion of the optical signal has a different phase than a second portion of the optical signal that is not passed through the one or more phase retarders.

17. (Original) A method, as claimed in Claim 15, wherein:
said first portion is the radiation in the optical signal that contacts the diffractive optical element within a radial distance of a center of the diffractive optical element while said second portion is the radiation that contacts the diffractive optical element outside the radial distance.

18. (Original) A method, as claimed in Claim 11, wherein:
in the detecting step, the spot size of at least one of the signal segments is reduced by a lens before the at least one of the signal segments contact a detector.

19. (Original) A method, as claimed in Claim 18, wherein:
the spot size is reduced by an immersion lens.

20. (Previously Presented) A method, as claimed in Claim 11, wherein:
the plurality of signal segments are reflected by a reflective surface after the dividing step and before the detecting step.

21. (Original) A method, as claimed in Claim 11, wherein in the dividing step:
said optical signal is focused with a diffractive optical element.

22. (Original) A method, as claimed in Claim 11, wherein:
the optical signal has a beam size at an aperture of a source transmitter associated with the optical signal that is less than an atmospheric inner scale.

23. (Original) A method, as claimed in Claim 22, wherein the beam size is no more than about 10 mm.

24. (Currently Amended) An apparatus for receiving an optical signal transmitted through free space, the optical signal being composed of radiation of a plurality of wavelengths, comprising:

at least one diffractive optical element for focusing a beam of radiation of different wavelengths at different corresponding focal points and thereby creating a focused beam of radiation, wherein said focal points are at different positions along the optical axis of said optical element, wherein said at least one diffractive optical element has a diameter that is greater than a Fresnel scale for said plurality of wavelengths and a distance from a transmitter, and wherein said focal points encompass a first area comprising a first spot size or greater;

a phase retarder, wherein less than an entire cross section of one of said beam of radiation of different wavelengths and said focused beam of radiation is passed through said phase retarder; and

a plurality of detectors, each detector being located at or near a different one of the focal points and receiving the radiation focused on the focal point corresponding to the detector, wherein each of the plurality of detectors has a photoactive area equal to a second area that is less than said first area, wherein each of said plurality of detectors is associated with a focusing element comprising an immersion lens that reduces the spot size of incident radiation to no more than said second area, and wherein a portion of said radiation focused on a focal point of at least two of said detectors has passed through said phase retarder.

25. (Canceled)

26. (Previously Presented) An apparatus, as claimed in Claim 24, wherein:
one of said immersion lenses is associated with each of the detectors to reduce the spot size associated with radiation converging on the respective detector.

27. (Original) An apparatus, as claimed in Claim 24, further comprising:
a reflective surface positioned on a first side of the at least one diffractive optical element.

28. (Original) An apparatus, as claimed in Claim 27, wherein:
at least some of the plurality of detectors are located in a hole in the at least one diffractive optical element.

29. (Original) An apparatus, as claimed in Claim 27, wherein:
at least some of the plurality of detectors are located on a second side of the one or more diffractive optical elements , the second side being in an opposing relationship with

the first side.

30. (Original) An apparatus, as claimed in Claim 27, wherein:
the plurality of detectors are located between the reflective surface and the at least one diffractive optical element and along an axis of the at least one diffractive optical element.

31. (Original) An apparatus, as claimed in Claim 24, wherein:
the at least one diffractive optical element has an obscuration and at least one of the plurality of detectors is located in a shadow of the obscuration with respect to radiation having a wavelength different from a wavelength of radiation converging on the at least one detector.

32. (Original) An apparatus, as claimed in Claim 26, wherein:
at least one of the detectors is integral with the corresponding immersion lens.

33. (Original) An apparatus, as claimed in Claim 26, wherein:
a plurality of the immersion lenses and a corresponding number of detectors have at least substantially parallel and collinear central axes and the central axes of the immersion lenses and corresponding detectors are at least substantially parallel and collinear with an optical axis of the at least one diffractive optical element.

34. (Original) An apparatus, as claimed in Claim 24, wherein an aperture size of the holographic unit exceeds the Fresnel scale.

35. (Currently Amended) An apparatus for receiving an optical signal transmitted through free space, the optical signal containing data, comprising:
a first holographic element for focusing radiation including a number of different wavelengths, wherein each wavelength is focused to a different point;
a phase retarder having an area that is less than an area of the first holographic element, wherein the phase retarder has a maximum radius that is no greater than 80% of a radius of the first holographic element;
a number of detectors; and
a number of second lenses, wherein one of said second lenses is located between the first ~~lens~~ holographic element and an associated detector, the second lens reducing a spot size of the focused radiation after passing through the second lens, wherein at least some radiation passed through said phase retarder is passed through each of said second lenses.

36. (Previously Presented) An apparatus, as claimed in Claim 35, further comprising:
a plurality of detectors, each detector being located at or near a respective focal

point and receiving the radiation focused on the respective focal point.

37. (Original) An apparatus, as claimed in Claim 36, wherein:
the plurality of detectors are positioned at spaced apart locations along an axis of the first lens.

38. (Previously Presented) An apparatus, as claimed in Claim 36, wherein:
each of the second lenses is an immersion lens.

39. (Original) An apparatus, as claimed in Claim 36, further comprising:
a reflective surface positioned on a first side of the first lens.

40. (Original) An apparatus, as claimed in Claim 39, wherein:
at least some of the plurality of detectors are located in a hole in the first lens.

41. (Original) An apparatus, as claimed in Claim 39, wherein:
at least some of the plurality of detectors are located on a second side of the first lens, the second side being in an opposing relationship with the first side.

42. (Original) An apparatus, as claimed in Claim 39, wherein:
the plurality of detectors are located between the reflective surface and the first lens and along an axis of the first lens.

43. (Original) An apparatus, as claimed in Claim 36, wherein:
the first lens has an obscuration and at least one of the plurality of detectors is located in a shadow of the obscuration with respect to radiation having a wavelength different from a wavelength of radiation converging on the at least one detector.

44. (Original) An apparatus, as claimed in Claim 38, wherein:
at least one of the detectors is integral with the respective immersion lens.

45. (Original) An apparatus, as claimed in Claim 35, wherein the second lens is an immersion lens having an index of refraction of at least about 2.3, having a radius of curvature ranging from about 400 to about 600 microns.

46. (Original) An apparatus, as claimed in Claim 35, wherein the second lens has a radius ranging from about 200 to about 300 microns.

47. (Currently Amended) A method for receiving high frequency signals transmitted through free space, comprising:
first passing an optical signal, the optical signal containing data, through a first lens comprising a diffractive optical element provided as part of a receiver to form

focused radiation having a first mean wavelength, wherein said first lens subtends at least about 50 microradians of a beam comprising the optical signal, and wherein at the receiver the optical signal has an angle of divergence of at least 20 microradians, and wherein less than [[all]] an entire cross-section of the beam comprising the optical signal containing data is passed through a phase retarder that is provided ~~separately from~~ in addition to the diffractive optical element;

second passing the focused radiation through a second lens to form converging radiation having a second mean wavelength, the first mean wavelength being different than the second mean wavelength; and

detecting data in the convergent radiation at a plurality of detectors, wherein at least some radiation received at each of said detectors has passed through said phase retarder, and wherein at least some radiation received at each of said detectors has not passed through said phase retarder.

48. (Original) A method, as claimed in Claim 47, wherein:

the optical signal is composed of radiation of a plurality of differing wavelengths; in the first passing step the first lens is a diffractive optical element; the focused radiation includes a plurality of signal segments, each signal segment having a different mean wavelength; and in the first passing step only a first portion of the optical signal is passed through a phase retarder.

49. (Original) A method, as claimed in Claim 47, further comprising, before the first passing step:

transmitting said optical signal through atmospheric distortion at a first rate that is greater than one gigabit/second.

50. (Original) A method, as claimed in Claim 48, wherein:

the first portion of the optical signal contacts a central portion of the diffractive optical element and wherein the first portion of the optical signal has a different phase than a second portion of the optical signal that is not passed through the phase retarder.

51. (Original) A method, as claimed in Claim 50, wherein:

said first portion is the radiation in the optical signal that contacts the diffractive optical element within a radial distance of a center of the diffractive optical element while said second portion is the radiation that contacts the diffractive optical element outside the radial distance.

52. (Original) A method, as claimed in Claim 47, wherein:

in the detecting step, each of the plurality of signal segments is detected by a different detector.

53. (Original) A method, as claimed in Claim 47, wherein:

the second lens is an immersion lens.

54. (Original) A method, as claimed in Claim 48, wherein:
after the first passing step and before the second passing step, the plurality of signal segments are reflected by a reflective surface.

55. (Original) A method, as claimed in Claim 47, wherein:
the optical signal has a beam size at an aperture of a source transmitter associated with the optical signal that is less than an inner scale.

56. (Original) A method, as claimed in Claim 55, wherein the beam size is no more than about 10 mm.

57. (Currently Amended) An apparatus for receiving an optical signal, the optical signal containing data, comprising:
a first optical element for focusing a set of different optical wavelengths in the optical signal at different locations along a first optical axis of said first optical element;
a second optical element for retarding a phase of a portion of said optical signal;
a reflective surface for reflecting the focused set of different optical signals and forming a reflected set of different optical signals; and
a number of detectors, wherein for each detector there is an associated ~~with an~~ immersion lens, wherein the immersion lens of each detector is positioned to receive one of the reflected optical signals, the immersion lenses being located along the first optical axis, and wherein each detector receives at some of said at least a portion of said optical signal passed through said phase retarder.

58. (Previously Presented) An apparatus, as claimed in Claim 57, further comprising:
a number of second lenses, wherein a second lens is located between the reflective surface and the detector, the second lens reducing a wavelength of the reflected optical signal, whereby a spot size of the reflected optical signal is reduced after passing through the second lens.

59. (Canceled)

60. (Original) An apparatus, as claimed in Claim 59, wherein:
the plurality of detectors are positioned at spaced apart locations along an axis of the first lens.

61. (Original) An apparatus, as claimed in Claim 58, wherein:
the second lens is an immersion lens and a respective immersion lens is located between each of a plurality of detectors and the first lens to reduce a spot size associated

with radiation converging on the respective detector.

62. (Original) An apparatus, as claimed in Claim 59, wherein:
at least some of the plurality of detectors are located in a hole in the first lens.

63. (Original) An apparatus, as claimed in Claim 59, wherein:
at least some of the plurality of detectors are located on a second side of the first lens, the second side being in an opposing relationship with the first side.

64. (Original) An apparatus, as claimed in Claim 59, wherein:
the plurality of detectors are located between the reflective surface and the first lens and along an axis of the first lens.

65. (Original) An apparatus, as claimed in Claim 59, wherein:
the first lens has an obscuration and at least one of the plurality of detectors is located in a shadow of the obscuration with respect to radiation having a wavelength different from a wavelength of radiation converging on the at least one detector.

66. (Original) An apparatus, as claimed in Claim 59, wherein:
at least one of the detectors is integral with the respective immersion lens.

67. (Original) An apparatus, as claimed in Claim 57, wherein the first lens has a focal length and the reflective surface is located at a distance from the first lens that is approximately equal to 50% of the focal length.

68. (Currently Amended) A method for receiving an optical signal transmitted through free space, comprising:

first passing the optical signal, the optical signal containing data, through a first lens to form a plurality of signal segments, each corresponding to a different median wavelength, wherein the first lens is a diffractive optical element;

second passing a portion comprising less than an entire area of a cross-section of the optical signal through a phase retarder;

reflecting the plurality of signal segments off a reflective surface to form reflected radiation; and

detecting data in the reflected radiation at or near an optical focal point for each of the signal segments, wherein a portion of each of said signal segments has passed through said phase retarder;

wherein the optical signal has a beam size that is less than a size of an inner scale in the vicinity of the source transmitter, and wherein passing a portion of the optical signal through a phase retarder reduces smear in the signal segments.

69. (Original) A method, as claimed in Claim 68, wherein:

in the first passing step a first portion of the optical signal is passed through a phase retarder.

70. (Original) A method, as claimed in Claim 69, wherein:
the first portion of the optical signal contacts a central portion of the diffractive optical element and wherein the first portion of the optical signal has a different phase than a second portion of the optical signal that is not passed through the phase retarder.

71. (Original) A method, as claimed in Claim 69, wherein:
said first portion is the radiation in the optical signal that contacts the diffractive optical element within a radial distance of a center of the at least one of a holographic unit, diffractive optical element while said second portion is the radiation that contacts the diffractive optical element outside the radial distance.

72. (Original) A method, as claimed in Claim 68, wherein:
in the detecting step, each of the plurality of signal segments is detected by a different detector.

73. (Original) A method, as claimed in Claim 68, further comprising:
second passing the reflected radiation through a second lens to form converging radiation having a median wavelength different from the reflected radiation.

74. (Original) A method, as claimed in Claim 73, wherein:
the second lens is an immersion lens.

75. (Canceled)

76. (Previously Presented) A method, as claimed in Claim 68, wherein the beam size is no more than about 10 mm.

77-89 (Canceled)

Allowable Subject Matter

2. Claims 1-24, 26-58, 60-74, and 76 are allowed.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6700856 B2, US 6687196 B1, US 6633439 B1, US 6614742 B2, US 6608808 B1, US 6580534 B2, US 6574174 B1, US 6556517 B1, US 6536899 B1, US 6496252 B1, US , 381044 B1, US 6370422 B1, US 6289151 B1, US 6236508 B1, US 6007747 A, US 5946281 A, US 5867315 A, US 5781257 A, US 5757523 A, US 5610734 A, US 5565668 A, US 5545896 A,

US 5469250 A, US 5444236 A, US 5438187 A, US 5373182 A, US 5303024 A, US 5255065 A, US 5150171 A, US 4975926 A, US 4957336 A, US 4939369 A, US 4687282 A, US 4227090 A, US 4115701 A, US 4092531 A, US 3609365 A, US 20060152700 A1, US 20010013960 A1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Agustin Bello whose telephone number is (571) 272-3026. The examiner can normally be reached on M-F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571)272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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